**Transformed E&M I materials**

**Multipole Expansion**

**(Griffiths Chapter 3)**

**TIMELINE**

Prof A covers this in lectures 19,20.

Prof B. covers this in lecture 16,17.

Transformed course covered in lectures 19-21.

**LEARNING GOALS**

1. Students should be able to explain when and why approximate potentials are useful.
2. Students should be able to identify and calculate the lowest-order term in the monopole expansion (i.e., the first non-zero term).
3. Students should be able to sketch the direction and calculate the dipole moment of a given charge distribution.

**CLASS ACTIVITIES**

**Tutorial**

**Multipole expansion: “Discrete” activity**

**Oregon State University**

Students work in small groups to create power series expansions for the elec-

trostatic potential due to two electric charges separated by a distance D.

**Griffiths by Inquiry (Lab 6): Multipole expansions**

**Discussion**

**Questions for lecture (from UIUC):**

1.) Why should we care about approximate solutions for the scalar potential V(r) and/or E(r)?

2.) What are electric multipole moments of an electric charge distribution?

3.) When is it appropriate to use such approximate solutions for the scalar potential V(r) and/or E(r)?